

AMENDMENT TO THE CLAIMS

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1. (currently amended): A ~~perpendicular read/write head for use within a disc drive storage system to record data to, and read data from,~~ a magnetic medium of a rotating disc, the head comprising:

a perpendicular writing element including a main pole having a main pole tip, a return pole having a return pole tip, the return pole located downstream of the main pole relative to the rotating disc and connected to the main pole at a back gap, a write gap between the main and return poles, and a conductive coil between the main and return poles and adapted to induce magnetic flux therein, wherein an area of a disc-facing surface of the main pole tip is less than an area of a disc-facing surface of the return pole tip;

a perpendicular reading element upstream of the perpendicular writing element relative to the rotating disc and including a top shield, a bottom shield upstream of the top shield, and a read sensor positioned between the top and bottom shields; and

a non-magnetic layer separating the top shield from the writing main pole.

2. (original): The head of claim 1, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoZrNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

3. (original): The head of claim 1, wherein the non-magnetic layer is formed of a non-magnetic insulating material.

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4. (original): The head of claim 3, wherein the non-magnetic layer is formed of silicon oxide (SiO_2), silicon nitride (Si_3N_4), aluminum oxide (Al_2O_3), or tantalum oxide (Ta_2O_5)

5. (original): The head of claim 1, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

6. (original): The head of claim 5, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3), silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

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7. (original): The head of claim 1, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

8. (original): The head of claim 1, wherein the gap layer defines a write gap of approximately 1 micrometer or less.

9. (original): A disc drive storage system including the read/write head of claim 1.

10. (currently amended): A ~~perpendicular read/write head for use with in a disc drive storage system to record data to, and read data from,~~ a magnetic medium of a rotating disc, the head comprising:

a perpendicular writing element including a main pole having a main pole tip, a return pole having a return pole tip, the return pole located downstream of the main pole relative to the rotating disc and connected to the main pole at a back gap, a write gap between the main

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and return poles, and a conductive coil between the main and return poles and adapted to induce magnetic flux therein, wherein an area of a disc-facing surface of the main pole tip is less than an area of a disc-facing surface of the return pole tip; and

- a perpendicular reading element downstream of the perpendicular writing element relative to the rotating disc and including a top shield, and a read sensor positioned between the top shield and the return pole, wherein the ~~wherein the~~ return pole serves as a bottom shield for the read sensor.

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11. (original): The head of claim 10, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoZrNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

12. (original): The head of claim 10, wherein the write gap is approximately 1 micrometer or less.

13. (original): A disc drive storage system including the head of claim 10.

14. (currently amended): ~~A disc drive storage system~~ A head for recording perpendicularly oriented magnetic patterns to a rotating disc, the head, comprising:

main and return poles separated by a write gap, the write gap having leading and trailing edges, the leading edge is defined by the main pole and is positioned upstream of the trailing edge, which is defined by the return pole, relative to the rotation of the disc; and

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Can 4* writing edge means for defining transitions between adjoining magnetic patterns recorded to the disc at the leading edge of the write gap.

~~a rotating disc having a recording medium; and~~

~~a read/write head means for performing perpendicular recording and reading of magnetic signals in the recording medium at a high areal density.~~

✓ 15. (currently amended): The system head of claim 14, wherein the main pole includes a main pole tip having a disc-facing surface whose area is less than an area of a disc-facing surface of a return pole tip of the return pole, the head ~~/write head means includes:~~

a ~~a perpendicular writing element including a main pole, a return pole located downstream of the main pole relative to the rotating disc and connected to the main pole at a back gap, a write gap between the main and return poles, and a conductive coil between the main and return poles adapted to induce magnetic flux therein;~~

~~a perpendicular reading element upstream of the perpendicular writing element~~ *read* main pole and including a top shield, a bottom shield upstream of the top shield relative to the rotating disc, and a read sensor positioned between the top and bottom shields; and

~~a non-magnetic layer separating the top shield from the main pole.~~

16. (original): The head of claim 15, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

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17. (original): The head of claim 15, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

18. (original): The head of claim 17, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3), silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

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19. (currently amended): The ~~system head~~ of claim 14, wherein the main pole includes a main pole tip having a disc-facing surface whose area is less than an area of a disc-facing surface of a return pole tip of the return pole, the head read/write head means includes:

~~a perpendicular writing element including a main pole, a return pole located downstream of the main pole relative to the rotating disc and connected to the main pole at a back gap, a write gap between the main and return poles, and a conductive coil between the main and return poles and adapted to induce magnetic flux therein; and~~

a perpendicular reading element downstream of the ~~perpendicular writing element~~ return pole and including a top shield, and a read sensor positioned between the top shield and the return pole, wherein the ~~wherein the~~ return pole serves as a bottom shield for the read sensor.